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Design and Implementation of AIP

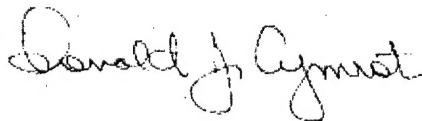
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Executive Summary

Background

To deal with recurrent manning shortages in certain billets, the Navy has traditionally either assigned sailors to hard-to-fill billets involuntarily or used a patchwork of nonmonetary incentives. This strategy has been costly. Previous CNA research found that retention dropped among sailors assigned involuntarily, and the costs to the Navy of existing nonmonetary incentives were high. To encourage sailors to volunteer for and remain in difficult-to-fill billets, the Navy began offering a new pay, Assignment Incentive Pay (AIP), for selected shore billets. Although the pilot program is modest, with a budget of \$1 million for FY03, the Navy expects to expand the program significantly, up to \$54 million annually by FY07. The Navy has structured the pay such that sailors can bid on an AIP-eligible billet during the detailing process. Sailors selected for the AIP-eligible billets then receive the monthly pay they requested for the duration of their tours.

The Navy expects AIP to be cost-effective for certain billets—particularly for overseas shore duty, which currently receives sea duty credit. In earlier CNA research, we calculated that the cost of using sea duty credit is at least \$85 million annually compared with our rough estimate of \$25 million annually for AIP. However, there is much uncertainty about how many sailors will bid or the size of the bid they require. Sailors' preferences and alternatives, as well as the structure of the bidding system and its implementation, will affect sailors' bidding behavior and, ultimately, the success of AIP. Over the course of this project, we modeled some simplified bidding systems, reviewed auction design materials, and discussed the Navy's assignment system and potential bidding systems with auction experts and Navy manpower personnel. We summarize, in this annotated briefing, some potential problems in AIP's design and implementation and offer some solutions the Navy might use to fine-tune the initial system.

Issues

We conclude that what sailors will bid and whether they will systematically bid more than they require (i.e., gaming) are among the most important concerns the Navy must be prepared to address. The more sailors game the system, the less likely is AIP to be cost-effective. We expect that sailors are more likely to bid high on AIP-eligible billets when they:

- Have many attractive alternative jobs (either in the Navy or in the civilian sector) available
- Are risk-takers who are willing to gamble on winning the bid
- Believe that there is little competition for the AIP-eligible billet

- Have cost advantages over other sailors (e.g., lower PCS, or training costs)
- Perceive that the bid does not weigh into the detailer's selection decision.

In the latter cases, the sailors will likely bid higher than their valuation of the billet if there are no control mechanisms in place.

Several options, however, are available to mitigate the gaming. The use of reservation caps and the threat of involuntary placement into an undesirable job should both serve to limit gaming. We believe better options are available, however. Encouraging competition is among the most promising strategies to minimize gaming. Other mechanisms, such as encouraging early bidding, are also worth further investigation.

In addition to the issue of gaming, we address a possible outcome of the bidding system—that there will be wide variation in winning bids for similar jobs. This has been a concern to some Navy policy-makers. We expect that variation might occur, for example, if there is variability in the size of the potential applicant pools. With small pools, there is less likelihood of a sailor having a preference for an AIP-eligible billet and, consequently, the winning bid may be high. What are the implications for the Navy even if this variation occurs? Perceived inequities might affect the way sailors view AIP, the Navy detailing system, and Navy life. We do not believe this will significantly harm the AIP program, however, for two reasons. First, variation in pay already exists and is acceptable to sailors. For example, sailors within a rating can receive different SRB levels. Second, the Navy can dampen swings in winning bids through AIP floors, re-advertising billets, and other means.

Finally, we turn to the need of the Navy to monitor and evaluate sailors' perceptions of AIP as well as program data. Evaluation of the applicant pools, number and range of bids, and demographics of AIP winners will help determine, for instance, the incidence of gaming, variability in winning bids, and adequacy of reservation caps.

Recommendations

We believe that AIP offers the Navy a potentially effective tool for getting sailors to volunteer for less desirable billets and keeping them there, but it is likely the AIP system will require adaptations as it evolves.

We urge the Navy to:

- Set reservation caps high initially and allow flexibility in the decision rules
- Present AIP-eligible billets and how to use the bidding system to sailors in a concise and appealing way from multiple sources (e.g., from career counselors, the *Navy Times*, and internet sites)
- Offer AIP for a limited pool of billets initially and assess its success
- Test, model, and implement strategies to increase AIP's cost-efficiency.

By following this course, the initial pilot will keep sailors engaged and informed, while allowing the Navy to improve the AIP system and lower its long-run costs.



Design and Implementation of AIP

Heidi Golding
Jerry Cox

The Navy has long faced critical shortages in certain billets. To alleviate these shortages, the Navy began offering Assignment Incentive Pay (AIP) in June 2003 to encourage sailors to volunteer for certain hard-to-fill billets. To receive AIP, sailors interested in an AIP-eligible billet state on their application in the Job Advertising and Selection System (JASS) the monthly pay they require to accept the job. If selected, sailors begin receiving their bid price on arrival at their new assignment.

To achieve the most effective structure and procedures for AIP, the Assistant Deputy Chief of Naval Operations, Manpower and Personnel (N1B) requested that CNA assist in its design, execution, and analysis. Over the course of this project, we modeled some simplified bidding systems, reviewed auction design materials, and discussed the Navy's assignment system and potential bidding systems with auction experts and Navy manpower personnel. This annotated briefing summarizes some of the issues we considered and discusses potential solutions the Navy might implement to fine-tune the initial system.

Outline



- Background on AIP
- Issues
 - What will sailors bid?
 - Will sailors “game” the system? And, if so, what can the Navy do to alleviate it?
 - Will there be variation in AIP among similar billets?
 - How can the Navy determine if the program is successful?
- Recommendations

In this first section, we give a brief overview of AIP—its structure, eligibility, and expected costs.

In the following section, we detail some issues in designing and optimizing an effective bidding system. We conclude, in the final section, with recommendations to assist the Navy in improving the AIP program.

Why an Assignment Incentive Pay?

- Create a voluntary system of assignments
 - Increase satisfaction and retention
 - Decrease turnover and enhance readiness
- Replace nonmonetary incentives with pay
 - Sometimes, Navy cannot fulfill promises
 - Expensive—annually sea duty credit costs at least \$85 million vs. \$25 million in AIP

The Navy has dealt with recurrent manning shortages in certain billets by either assigning sailors involuntarily to hard-to-fill billets or using a patchwork of incentives. Some current incentives include the promise of a preferred future assignment or giving sea duty rotational credit for a shore duty assignment.

The Navy's strategy has been costly. Previous CNA research found that retention dropped significantly among sailors who received undesirable billets [1]. In addition, the cost of existing incentives, even ignoring the retention cost, is expensive. For example, we calculated the cost of using sea duty credit to get sailors to fill overseas shore billets at more than \$85 million annually [2]. In comparison, the cost of AIP to replace the sea duty credit should be substantially lower—roughly \$25 million annually [2].

By offering a pay incentive in which sailors volunteer for billets that are traditionally less desirable, the Navy should mitigate its manning shortfalls, decrease turnover in critical billets, and increase retention—all at a lower cost.

AIP

- Monthly pay for duration of tour
- Legislated maximum rate of \$1,500 per month
- Initially offered to selected overseas shore billets
- Navy budget
 - FY03—\$1M, FY04—\$13.5M, FY05—\$31.5M, FY06—\$48.5M, FY07—\$54M

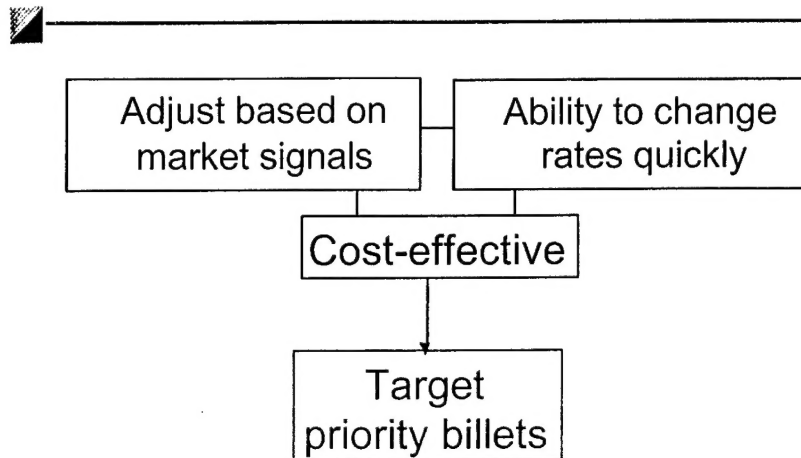
How is AIP structured? The Navy will pay AIP monthly to sailors for the duration of their tours in certain hard-to-fill, AIP-eligible billets. The maximum payment set by law is \$1,500 per month; Navy policy is a maximum of \$750 per month. Rates can vary for individual billets.

In the pilot, the Navy will make a limited number of overseas shore locations eligible for AIP—billets, in general, for which sailors currently receive sea duty credit. When they become eligible, the billets revert to shore duty with shore duty credit. Shore billets in Sigonella, Naples, and Misawa (traditionally hard-to-fill locations) are the first to be AIP eligible; more overseas locations will be added gradually. From a total of about 120,000 enlisted shore billets (including those receiving shore or sea duty credit), about 5,000 shore billets will be offered AIP eligibility initially.

As the program evolves, the Navy expects to open AIP eligibility to all shore billets receiving partial or full sea duty credit. The number of AIP-eligible billets would then rise to roughly 12,000. AIP may eventually be expanded to certain other hard-to-fill shore and sea billets.

The budget for FY03 is \$1 million. By FY08, the projected costs for AIP are more than \$54 million annually.

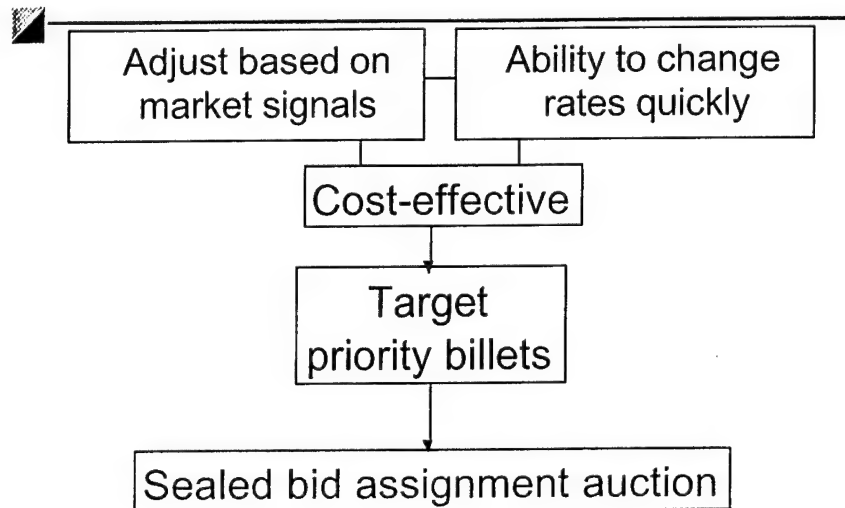
Navy's AIP Pilot Program



Here, we show some of the desired features of AIP. The Navy envisions AIP as a flexible, market-based pay that will vary to balance the Navy jobs available with the supply of qualified volunteers. Theoretically, AIP should be cost-effective. It will encourage sailors with the least distaste for certain locations or billets to apply for jobs that sailors tend to dislike. Consequently, for AIP-eligible billets, the sailors who volunteer would likely not require as much pay as the average sailor would.

One decision the Navy faced was billet eligibility—whether to pay AIP in certain locations or for specific billets. Initially, the Navy is making only certain undesirable locations eligible for AIP. As a result, the pay is targeted to its problem billets, although not all billets at a location may be difficult to fill. Because of its targeting, AIP should be more cost-effective than an across-the-board pay for all sailors receiving new assignments. Eventually, the Navy may specify certain billets within a location as AIP eligible.

Using an Auction System



How should the Navy set AIP rates? Setting a single rate across all eligible billets would not be the lowest cost approach. It is likely that, for some billets, the set rate would attract no bidders; for others, the Navy would pay more than necessary to attract qualified volunteers. Instead, the Navy can allow the price to fluctuate billet by billet by implementing an auction or bidding system. Broadly speaking, auctions are usually structured as one of the following:

- *An ascending bid system.* The Navy would offer an initial AIP level and, if there are no applicants, would increase the award until it receives at least one qualified applicant.
- *A descending bid system.* The Navy offers a maximum AIP. If there are multiple qualified applicants, it lowers the bid until only one qualified sailor remains.
- *A sealed bid system.* A sailor could put in a bid for a billet that no one would see until the end of the bidding period.

The first two options may give the Navy less choice in selecting sailors than the last option does. In addition, ascending and descending bid systems would probably extend the matching process for a billet over several requisition cycles. Sailors would have to track job openings and changes in award levels. For deployed sailors, this might be difficult.

Structured correctly, a sealed bid system can attract multiple applicants with different bids. The Navy can then make decisions based on the sailors' qualifications, the bids offered, and other factors important to creating a good match. The Navy, using the sealed bid auction, also gets more information from more sailors on billet preferences. Because of the advantages, the Navy is establishing a sealed bid system.

Sailors will use JASS to apply for jobs and to enter bids on AIP-eligible billets.

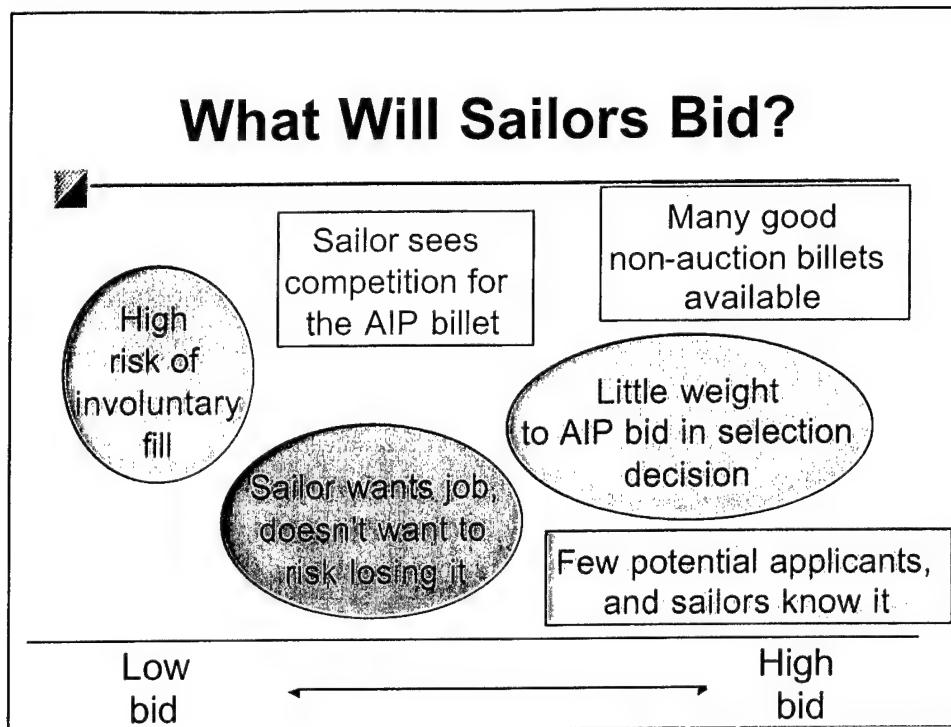
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 - How can the Navy determine whether the program is successful?
- Recommendations

In this section, we turn to some issues the Navy must think about as it proceeds. Some are purely design questions, such as whether gaming will occur. Others, however, involve the acceptability of some potential outcomes of the AIP bidding system. We offer short- and long-term solutions for the Navy to consider. We also discuss ways the Navy can determine whether the program meets its goals.

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This slide illustrates some situations that would involve variation in bid levels. Depending on the preferences and opportunities of sailors and the market mechanism the Navy decides on, the size of bids could vary substantially from sailor to sailor. Indeed, a person's valuation of a specific billet can change over time as his/her opportunities (in or out of the military) or preferences change.

This bidding system takes advantage of sailors having different preferences and options. For example, sailors who dislike a billet less than the average sailor, or even favor it, should bid lower for that billet than other sailors. The cost of AIP should, consequently, be lower than with a system that involuntarily assigns sailors randomly into billets and then tries to compensate the sailors for their dislike of the billets.

However, we are concerned that sailors will not only bid based on their other options and preferences, but that they will systematically game the system (i.e., bid at levels over and above those needed to induce the sailor away from his/her next best alternative and volunteer for an AIP billet). If sailors are likely to bid higher than necessary, the Navy must consider mechanisms to minimize the gaming. The ability of the Navy to do so will determine AIP's cost-effectiveness.

In the following slides, we will explain when we expect sailors' bids to be high as a result of gaming or for other reasons.

Competition Is Key

- If sailor has acceptable non-auction alternatives, more likely to bid high
 - As perception of alternatives changes, bids will change
- If sailor knows few others are available, more likely to bid high
 - Knows that there is less competition

The level of competition for both AIP and non-AIP billets, and the information sailors have about it, are key determinants of the rates that sailors will bid.

First, consider the effect of competition for non-AIP billets. If there are many acceptable non-AIP billets available compared with the number of sailors, then losing an AIP-billet is not of great consequence to the sailor. Sailors may bid more than they would with fewer acceptable billet options available because the utility they get from winning it would exceed the sure-bet alternative. Of course, as sailors get closer to their projected rotation date (PRD), they may be at risk of being involuntarily assigned. In that case, an unattractive billet is their other option, and they will be more likely to bid less on the AIP billet than they would have if job opportunities were better. Their alternative job options are driving their bid price.

Now consider the effect of competition for AIP billets. If the competition is substantial and sailors know it, gaming is less likely to occur. Sailors will bid their true valuation, whether it be a high bid or a low one, because they would be less likely to win the AIP-eligible job if they bid higher. If sailors know, however, that few sailors are interested in an AIP job and that job must be filled, they are more likely to bid higher than necessary to accept the job. Gaming of this sort could be a problem at the higher paygrades and for smaller communities.


Weight Detailers Place on AIP Bid Matters

- Many other determinants of match
 - Sailors' qualifications
 - Sailors' moving and retraining costs
- If bids matter little, expect high bids
 - System will appear arbitrary
- If selection based on many factors, sailors with advantage will bid high

How the detailers make their selections will also affect the bids sailors will place on AIP-eligible jobs. When matching a sailor and a job, detailers consider over 30 items, including sailors' qualifications, PCS costs, and billet priority. Although detailers will likely pare down the list, several factors, along with the AIP bid, will continue to influence the choice of who receives orders for a given billet. As a result, the lowest bidder will not always be the winner. The AIP system can still be a smoothly functioning and efficient system, but only if the bid is a significant factor in the decision process. If detailers place little weight on the bid in the selection process, sailors have less incentive to bid low. Bidding low, in this circumstance, does little to increase their chances of receiving the AIP billet and the winner may appear arbitrary to the sailors.

An additional problem with factors, outside the AIP bid, influencing the selection process occurs if sailors know they have an advantage over others along one or more of those dimensions. Gaming could occur. For example, sailors who are already at a location may put in higher bids knowing that their PCS costs are low.

Possible Mitigating Factors

-  The *greater the uncertainty* about others' bidding and costs, the more likely sailors are to bid true value
 - If lots of sailors in detailing window, more uncertainty about others' bids and preferences
 - Especially if chasing few billets
- *Risk-averse sailors*
 - If sailor wants a greater assurance of receiving a billet, bid will be lower

Underlying the bids sailors offer and the extent of the gaming are two issues: the information sailors have about winning billets and how much sailors care about winning an AIP-eligible billet.

If sailors lack information about their competition for a billet, they cannot accurately assess the likelihood of winning the billet and will bid their true valuation. Likewise, if sailors prefer the AIP billet and want to maximize their probability of winning a bid, they are less likely to bid higher than the true worth of the billet.

What Are Some Mechanisms To Reduce Gaming?

- Reservation caps
- Retain some slamming
- Bidding under uncertainty
- Other pricing mechanisms

To alleviate problems that could arise if gaming is severe, the Navy must investigate options designed to end it. Here, we list several ways the Navy could reduce gaming. We discuss these options in the next slides.

Reservation Caps



- Sets upper limit on gaming
- If too high, Navy spends more than necessary
 - Only if there is gaming
- If too low in pilot, may eliminate gaming but
 - Can't test measures designed to end gaming
 - Navy may have to involuntarily fill billets
- Stop-gap solution
 - Limits gaming but doesn't eliminate it
 - Allow flexibility in changing cap

Reservation caps, or rate limits, on AIP awards will exist because of statutory maximums. Reservation caps also limit the gaming sailors can do but represent a short-term answer. Caps constrain the gaming; they don't solve the problem [3].

Another problem with rate limits is that they are difficult to set appropriately. Setting them too high may leave substantial room for gaming, and the Navy may pay significantly more in AIP than an optimally designed system would cost. If set too low, however, we believe the consequences are even more detrimental to the eventual efficient functioning of the system. Reservation caps that are too low will result in sailors not bidding on AIP billets. Those billets then would be left vacant or the Navy might resort to involuntary assignments to the billets. Either case results in undermining the objectives of the special pay and means that other measures that might end gaming could not be tested for effectiveness. AIP becomes another special pay that helps but may not wholly compensate sailors for hardships.

Because of the difficulty in setting reservation prices, allowing flexibility to change them is crucial. In the short term, examining the number and size of bids will be important in setting the maximum rates. Over the longer term, the reservation prices should be set not to reflect the demand for the billet, or to limit gaming, but to reflect the value of the specific billet to the Navy. Of course, that value will change with manning and other conditions, and determining a billet's value could be difficult. Although billet priority should help assign a reservation cap, input from the command would also help in placing a value on the filled billet.

Threat of Involuntary Assignment



- The stick: If likely to get an undesired job, sailors bid more realistically on AIP billets
 - Bids may still vary around true value
- Limits gaming as approach PRD
- Available solution to gaming
 - Can be used right away
 - There may be better long-term solutions

Another way the Navy might reduce gaming is by retaining the risk of sailors receiving an undesirable assignment.

This solution is, however, only a partial one. Because the sailors have several months to decide on their match before the risk of being involuntarily assigned, it is likely for sailors to bid high on AIP billets knowing that another acceptable assignment will be available in the next requisition cycle. It is, consequently, a significant threat only late in the detailing window. Even then, it will be effective only if the involuntary assignment is to either an undesirable non-AIP-eligible billet or an AIP-eligible billet in which the maximum AIP is too low to compensate the sailor for his/her dislike of it.

An additional problem with this resolution of the gaming problem is that it is at odds with the CNO's goal of eliminating involuntary assignments. Fortunately, other means are available for sailors to reveal their true value of a billet when bidding on an AIP-eligible billet, as we detail in the following slides.

Encourage Competition

- - Widespread bidding
 - Uncertainty that a sailor will receive billet with a high bid increases
 - Bidders will likely have different preferences
 - Collusion among sailors is difficult to maintain
 - Increase competition through visibility of AIP program
 - Short- and long-term solutions to most gaming

We believe that widespread bidding on auctioned billets is critical to a successful AIP program. Increasing the competition between sailors for AIP-eligible billets decreases the probability of winning the billet. To increase the chance of obtaining the billet, sailors are more likely to bid just enough to compensate them for the hardships of the billet (their true valuation). Assuming that sailors have different preferences, it is more likely that, with several sailors interested in a billet, one of them will truly desire the job and will bid low.

The Navy has several means of increasing competition for AIP billets. First, it can encourage sailors to bid on AIP billets by engaging in a highly visible information and training program. The purpose would be to make sailors and detailers knowledgeable of and comfortable with the bidding system. Both the rules of winning and the mechanics of the system must be understood. To familiarize sailors with the bidding system, the Navy could allow sailors to place “mock” bids before applying for billets.

The Navy could increase the information sailors receive on little-known, traditionally hard-to-fill billets, which could generate more bids. Sea Warrior is already part of that effort, but we envision an ongoing online survey. Sailors could rate their current locations/jobs in terms of area schools, job opportunities for spouses, and housing availability. Before applying for billets, sailors could obtain suggested locations/jobs based on attributes important to them. Sailors could also find out what was important to previous applicants for any given AIP or non-AIP job. In this way, sailors should become aware of jobs they might not have considered and have information available to make more informed choices. The system could potentially generate the probability of the interested sailor obtaining a job given his/her characteristics. These ideas can be incorporated into the existing systems, though not immediately.

But, Competition May Not Always Be Feasible

- Not always enough sailors rotating to generate competition
 - Increase length of requisition cycle
 - Increase detailing window
- Sailors can apply for only 5 billets in a requisition cycle

Despite the mechanisms (just discussed) to increase competition, there are various impediments. AIP-eligible billets are billets the Navy believes that sailors generally don't want and for which there would be little or no competition without an incentive. Encouraging competition, however, may not be successful if the pool of potential qualified sailors in the detailing window is small. This is particularly true for billets requiring more experienced sailors or for smaller communities. A traditional 2-week requisition cycle may generate few, if any, applicants. Increasing the detailing window and the requisition cycle for selected billets could alleviate the applicant flow problem.

Another problem in generating competition is simply a holdover from the original design of the Job Advertising and Selection System (JASS). The Navy limited the number of billets for which sailors could apply in a requisition cycle. We feel strongly that this limit should be raised or eliminated. Such limits hamper competition for traditionally undesirable jobs. Sailors would likely use their five applications to apply for the most desirable billets. Some unpopular billets will end up with few or no bids. By eliminating or loosening the application restrictions (in conjunction with increasing information about available jobs), sailors should be more likely to bid on AIP-eligible billets. An additional benefit of removing the restriction is that the Navy should obtain more information on what billets are preferred and by how much.

One option, besides unlimited bids, might be to constrain non-AIP and AIP-eligible bids to, say, five each. This would restrict the sailors' "good" alternatives and increase sailors' awareness of AIP billets.

Other Mechanisms

- • Encourage early bidding
 - Less knowledge about other potential bidders
 - Give sailors who do so an advantage
 - Allow sailors to revise bids
- Alternative AIP rate determination
 - For example, give winning sailor next higher bid

Even with competition, not all gaming opportunities will disappear. For example, when sailors have cost advantages (e.g., low PCS costs), they are more likely to win an AIP-eligible billet, even if others have lower bids. Knowing this, low-cost sailors have an incentive to increase their bid by their cost advantage.

Another means to avoid some gaming problems is by encouraging very early bidding. For example, sailors on a shore billet could bid on their next shore tour. They don't know what their cost advantages are or how many sailors are likely bidding for the same billet. In return for early bidding, they could receive an advantage in selection. For example, detailers might see an early bidder's price as \$50 or \$100 lower than it actually was and base their selection decision on this lower amount. However, because family circumstances, sailor preferences, and choice of billets do change over time, sailors should not be locked into their initial choices (although they would no longer receive an advantage). Because of sailors' changing preferences for assignments and military life, detailers would still make the final selection and generate orders in the sailors' normal detailing window at the end of their next sea duty tour.

Alternative ways to determine the AIP rate that sailors receive can also minimize gaming. So far, we've assumed that the winning sailors receive the AIP they bid. Some auctions, however, are structured as "second price auctions." In this case, the winning sailor receives the difference in his/her overall cost advantage (which includes AIP) over the next best applicant. Thus, the sailor has no incentive to bid high to take advantage of his/her cost advantage [4]. Other pay mechanisms still to be investigated may also lower the costs of matching sailors to billets.

Will There Be Variation in Winning Bids?

- Possibly, depends on
 - Decision rules
 - Number of sailors in detailing window and their preferences
- If the number of potential applicants varies considerably over cycles, more variation

Although we have focused on bid size and gaming, another issue we want to highlight is the possibility that billets—for the same skill in the same location—may have very different AIP levels awarded. This situation is most likely to occur if the competition for AIP billets varies substantially from one requisition period to another. When a large pool of potential applicants is available, it is likely that one of them will desire the AIP-eligible billet and offer a relatively low, or zero, bid. However, if in another cycle, the pool of potential applicants is small, there is less chance that one of them will have a preference for the AIP billet, and the bids are likely to be high. Seasonality in applicant pool size resulting from sailors' preferences to move in the summer could account for this variation in pay levels.

If this occurs, the Navy must decide: is it acceptable for sailors working side by side to receive different rates of AIP? Perceived inequities might affect the way sailors view the program, the Navy detailing system, and Navy life.

If the Navy deems it necessary, it can lessen the variation in AIP awards. One way would be to place not only caps but also floors on the amount the Navy will pay. This policy will, however, increase the program's total cost. The Navy might have had a volunteer for the billet at a lower AIP. Other options may be to either increase the length of the detailing window and/or the requisition cycle to dampen the swings in the size of applicant pools, or re-advertise a billet if no bid is within a certain range of the previous winning bid. Both should decrease the variation in AIP awards—potentially at a lower cost than the first alternative.

In the longer run, even if variation in AIP occurred in the original pilot program, it may lessen in severity. For example, if there is seasonal variation in AIP awards, sailors may extend on station and enter the detailing process when awards are high. They could then bid slightly higher than if they hadn't extended, but lower than the usual winning bid for that season. As a result, winning bids for similar billets should become more comparable.

Note that, even if the differences in winning bids do not dissipate over time, variation in pay does already exist. For example, sailors within a rating can receive different SRB levels.

How to Determine Success?

Preliminary Assessment



- Do sailors know about AIP?
 - Has it improved satisfaction with the assignment process?
- Are shore manning shortfalls being alleviated?
 - Are sailors bidding for AIP-eligible jobs?
 - Are reservation caps set correctly?

Finally, we turn to the need of the Navy to evaluate AIP. Here, we list some of the questions that we believe must be answered in determining its success. We recommend that an analysis of its outcomes start early and remain ongoing. Initial uncertainties exist about the prices sailors will bid, the administrative burden of the system, and the perceptions of both detailers and sailors. Careful and continual monitoring of the pilot will be important so that problems can be dealt with quickly—before they are ingrained in the system.

AIP's overall success should be judged along several dimensions. The first element is simply to determine whether sailors know about and understand the AIP program. In conjunction, the Navy should ask whether sailors believe that AIP has made the detailing process easier and less arbitrary, and whether the orders sailors receive are more satisfactory. Feedback from the detailing community and sailors who use JASS would be very valuable at the onset. Periodic interviews as the program evolves would reveal whether and how perceptions about AIP have changed—for better or for worse.

The Navy must know, as the pilot expands, whether the primary goal of AIP is being fulfilled and, if so, whether in a cost-effective manner. Is AIP alleviating manning shortfalls? Analysts can investigate (1) whether billets are being filled that previously would have been gapped, (2) whether hard-to-fill billets are being filled more quickly than before and with volunteers (e.g., are there bids on the billets?), and (3) whether sailors are staying in the AIP-eligible jobs longer than their previous counterparts. If certain billets are not being filled, the program managers must determine why and whether they should raise the reservation caps.

How to Determine Success?

Cost Issues

- Is the design of AIP having negative consequences?
 - Is gaming occurring?
 - Could the Navy change AIP decision rules to fill AIP-eligible billets at a lower cost?
- What is the quality and total cost of winning-bid sailors?
- Is AIP cost-effective?
 - Could the billets be filled using other incentives at a lower cost?

The Navy should also determine whether the design of the bidding mechanism needs fine tuning to lower the costs of the program and increase its efficiency. Is gaming occurring and, if so, to what extent? Analysts could examine the range of bids, number of bids, and size of the potential applicant pool. A large number of bids at the reservation cap may indicate a problem with gaming. If the Navy decides that an unacceptable level of gaming is occurring, program managers may want to change some decision rules or the bidding mechanism to reduce the problem. Such actions should make the AIP program less costly.

One of the objectives of the program is to fill billets with volunteers, but the Navy does not want the quality of the sailors assigned to them to deteriorate. Analysts can judge this by comparing the quality of the sailors in AIP-eligible billets after the program's implementation with that of sailors before it began. The total cost of the winning applicant is important to know also. Including AIP, PCS, and retraining costs, is the lowest cost applicant winning the billet? Demographic shifts in the sailors filling AIP jobs may have changed leading to cost implications. For example, PCS and housing costs could decrease if the balance of sailors accepting AIP jobs shifts to more single sailors.

Finally, over the longer term, the Navy must determine if AIP is cost-effective compared with the other incentives it has available. Earlier CNA research based on survey data suggests that it should be—at least for shore billets receiving sea duty credit in the past [2]. However, this needs to be verified based on actual AIP cost data.

To answer these questions, the Navy must collect and analyze sailors' applications and bids as well as other information. In the appendix, we detail some of the data and methodologies the Navy might use.

Outline

- Background on AIP
- Issues
 - What will sailors bid?
 - Will sailors “game” the system? If so, what can the Navy do to alleviate the problem?
 - Will there be variation in AIP among similar billets?
 - How can the Navy determine if the program is successful?
- Recommendations

In this final section, we present some recommendations for the initial implementation and later fine-tuning of AIP.

Recommendation

Generate Interest in AIP Billets

- • Offer potentially higher than necessary caps
 - Underpaying could result in involuntary fills and not give AIP a chance to succeed
 - Generates interest of sailors
 - Encourages widespread bidding
- Emphasize marketing of AIP
 - Sailors must know that AIP exists
 - Sailors need to realize that payments can vary; it's not an entitlement

First, we urge the Navy to set reservation caps high initially. Doing so serves two purposes. It makes the Navy less likely to resort to involuntary fills, and it quickly reveals any problems in the initial bidding system. If the Navy receives few bids or bidding at the caps are common problems, analysts can then evaluate the cause—whether it is gaming, lack of information about AIP, or the lack of potential applicants. The Navy could then implement means to improve the AIP system. Previous CNA research [5] presents survey data on the awards sailors say they require to volunteer for certain locations and should provide guidance in setting caps. Besides high caps allowing problems to surface quickly, if advertised sufficiently, the potential for receiving a large supplement to monthly pay should encourage sailors' to bid for AIP-eligible billets.

We also recommend that sailors and detailers receive information about AIP and how to use JASS to place bids in a concise and appealing way from multiple sources (e.g., from their career counselors, the *Navy Times*, and internet sites). For AIP to be successful, sailors must participate in the system, which requires knowing that AIP exists and understanding how the system works. Because AIP is paid so differently from existing incentive pays, sailors' ability to practice bidding would also be helpful.

Overall, for the program to flourish over the longer term, the initial pilot must keep sailors engaged in the system, convincing them that the assignment decisions are fair and that the assignment matches are better than would otherwise have occurred.

Recommendation

Implement Slowly and Retain Flexibility

- Offer to limited overseas locations initially and assess its success
 - Likely to be cost-effective
- Design initial decision rules with flexibility
 - e.g., allow changes in reservation caps
- Test, model, and implement strategies to increase its cost-efficiency
 - Both in short term and longer term

Initially offering AIP to a limited set of billets will provide valuable information on immediate difficulties and the likely success of a larger scale program. Making AIP available to sailors in overseas shore billets receiving sea duty credit is a logical starting point. Replacing sea duty credit with AIP is likely to be cost-effective even if the initial system is not immediately optimized.

Of course, some problems may not emerge immediately. It is possible, for example, that it will require time for sailors to learn how to game the system. For that reason, monitoring the outcomes throughout the initial stages is important. The Navy can obtain feedback from sailors and detailers, analyze application data, and measure sailors' responsiveness to a new type of pay. Program managers can then evaluate whether the goals of AIP are being met.


By allowing as much room as possible for changing business rules, the Navy can build in new attributes as the problems and successes become known. In preparation, researchers could measure the impact of various environmental influences as well as AIP features (e.g., test the mitigating effect of competition or early bidding) on sailors' bids. These experiments could be conducted in mock-bid sessions in controlled settings. This would allow a quicker and smoother optimization of AIP's decision rules.

In the long run, researchers should also design and test alternate selection algorithms. Currently, detailers attempt to place the least-cost sailor in a billet. That may not, however, be the least-cost assignment system. See [6] for examples. For the assignment system to be its most cost-efficient, it may require an additional mechanism beyond the bidding system—a selection system that optimizes the matching process over all assignments in a systematic way. Whether such a system is feasible is yet to be resolved.



Appendix: Data Requirements

Comparisons for Determining AIP's Success

-  Supply and demand for billets pre- and post-
 - To determine if AIP alleviates undermanning
 - To identify gaming and set reservation caps
- Winner versus loser
 - To examine whether detailers are selecting the least-cost sailor
- Last sailor versus replacement
 - To examine quality, and other, differences
- Complexity of administration

Comparing the number of bids and potential applicants as well as the winners and losers of AIP billets will be among the first steps in evaluating the usefulness of the new AIP. Reservation caps can be raised or lowered based on this information. To evaluate improvements in manning, AIP billets should be compared before and after AIP eligibility. Analysts can determine whether billets are being filled and the desirability of billets given a pay incentive. Comparisons to non-AIP billets before and after the program implementation can also be helpful. A preliminary assessment of the success of AIP, however, cannot rely solely on data from the new Distribution Incentive Management System (DIMS); historical JASS data are needed. Additional information on the ease of use and reactions from detailers will help determine the usefulness of the AIP/DIMS and whether it will be used in the future.

Data Requirements

Application and Orders Data



- Sailors available
- Number of bidders/takers
- Winning and losing bids
- Time to fill
- Priority of billet

Here we list some specific data that will be needed to evaluate and fine-tune the AIP program. Most of these data should be readily accessible from the DIMS/JASS data and the Enlisted Master Record (EMR).

Basic statistics should shed light on the success of the program. We suggest tracking the following: (1) the number of bids generated for a billet, (2) the number of bids versus the number of sailors in their detailing window (i.e., the number of potential applicants or sailors available) within a paygrade and skill mix, and (3) the percentage of bids at the maximum, given that any bids are made for that billet.

In addition, analysts can compare how quickly AIP-eligible billets are being filled compared with the pre-AIP period. This time to fill is not a variable within the DIMS but can be constructed using the data. This is one indicator of the willingness of sailors to volunteer for a hard-to-fill billet given its reservation cap. Of course, this is only one aspect of the success of the program; even if the hard-to-fill billets take longer to fill, AIP may be less costly than the existing incentives. For that reason, analysis of the return on investment for the various incentives should also be undertaken.

Data Requirements

Sailor-Specific Data

- Time to selection
- PCS and retraining costs
- Experience levels/qualifications
- Demographics
- Retention

One way to determine whether sailors are more satisfied with the new system is by measuring the average time to selection both before and after AIP introduction. If time to selection shortens, sailors presumably are having an easier time finding acceptable billets, and the Navy is less likely to resort to involuntary assignments.

By matching sailors' costs (AIP, PCS, and retraining costs), the Navy can see whether or not the least-cost sailor won the billet. If not, the Navy must determine whether detailers' decisions were consistent with the goals of AIP, or whether changes in the detailers' decision matrix must be made. Although comparing the overall cost of the winner of a specific billet with the other applicants will be useful, expanding the cost analysis of the winner to the universe of potential applicants for the billet will give a more accurate assessment of potential cost savings by fine-tuning AIP rules.

To rate the success of AIP, the Navy must also know if the quality of the personnel filling the AIP billets is being maintained. Quality comparisons would include differences in AFQT scores and schooling (including Navy-specific training), and how quickly applicants had been promoted compared with the rest of their accession cohort.

Over the longer term, sailors' retention rates before and after AIP ought to be examined to see if AIP is improving their quality of life and whether that translates into staying in the Navy at higher rates than before.

These comparisons would require not only DIMS/JASS information on who applied to each job but also the merging of personnel files, such as the EMR.

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